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EXTERIOR WALL PANEL OF A BUILDING
[Gebaeudeaussenwandelement]

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Specification /1*

The invention relates to the exterior wall panel of a building with a weather-side outer layer, an air layer which adjoins on the room side, and an insulating layer.

Exterior wall panels for residential structures or the like have generally been prepared for a long time with an air layer between a room-side part and a weather-side outer layer. For heat insulation there is an insulating layer which borders the air layer on one side. These exterior wall panels are also roof constructions in which the weather-side outer layer can be formed by roof tiles or the like. For masonry walls the weather-side outer layer is implemented by a second wall shell or by a non-bearing facade.

The air layer and the insulating layer are used for heat insulation of the wall panel. It has been shown that the described structure has been able to significantly cut heat losses. In this connection the quality of the heat insulation is dependent on the quality of the insulating layer, therefore on the insulation material and the thickness of the insulating layer. Good heat insulation therefore presupposes a relatively thick insulating layer, yielding a relatively voluminous wall structure with relatively high costs.

Therefore, the object of the invention is to prepare the exterior wall panel of a building of the initially mentioned type in which the same heat insulation is achieved with a thinner insulating layer or improved heat insulation is achieved with an insulating layer of the same thickness.

This object is achieved as claimed in the invention in that on the

* Numbers in the margin indicate pagination in the foreign text.

exterior boundary of the air layer there is a layer which reflects heat radiation.

The invention is based on the finding that a major portion of the heat losses which penetrate through the exterior wall of the building is formed due to heat radiation which is only inadequately attenuated by the insulating layer. The heat radiation does not travel through the reflecting layer on the exterior boundary of the air layer into the weather-side outer layer so that it remains cooler, and heat losses are therefore reduced.

Preferably the reflecting layer is formed by a foil with which the insulating layer which points toward the weather-side outer layer is lined. This structure is especially advantageous when the room-side boundary of the air layer is formed by an insulating layer and when moreover the air layer is joined to the input of a heat pump with an output which is returned again to the air layer, so that preferably between the air layer and the heat pump a closed circuit is formed in which the lost heat penetrating through the room-side boundary of the wall panel with the air of the air layer is pumped out and recovered in the heat pump. This system is disclosed by German patent 30 08 630. This system is further improved by the reflecting layer on the outside boundary of the air layer by the efficiency being increased by roughly 30%.

The use of reflecting foils to build wall panels is inherently known, especially for roof constructions. The aluminum foil used in this connection is used as a vapor barrier which prevents penetration of wet, warm room air into the cold wall structure, and thus condensation of the moisture in the wall. Therefore the aluminum is

generally located on the inner room side of the insulating layer behind which toward the exterior of the building the air layer is located. Transfer of heat from the heated air layer into the weather-side outer layer by heat radiation is thus not prevented so that the weather-side outer layer is heated and heat is increasingly released toward the cooler outside air.

The reflecting layer as claimed in the invention conversely prevents heat transfer caused by heat radiation from the heated air layer to the weather-side outer layer so that the weather-side outer layer remains cooler and the heat losses are thus reduced.

The invention will be detailed below using embodiments shown in the drawings.

Figure 1 shows a cross section through twin-shell masonry with an air layer provided on both sides with insulating layers for heat recovery;

Figure 2 shows a roof structure with an air layer between two insulating layers.

The twin-shell exterior wall panel of a building which is shown in Figure 1 consists of room-side masonry 1 adjoined to the exterior by an insulating layer 2. The insulating layer is adjoined by an air layer 3 which is bordered to the outside by a second insulating layer 5 which is lined with aluminum foil 4. The aluminum foil is used as a reflecting layer and can be provided with openings which prevent the aluminum foil from acting as a vapor barrier, by which condensation in the air layer 3 could occur. The exterior wall panel is closed to the outside by weather-side masonry 6.

Figure 2 shows a roof element which has fundamentally the same

structure and which of course does not have masonry shells 1, 6. The roof element is closed on the inner room side by an insulating /2 layer 2' onto which panels suited for completion of the interior are optionally applied. An air layer 3' is bordered to the outside by an insulating layer 5' which is lined by aluminum foil 4'. The outer insulating layer 5' is closed by a weather-side outer layer (not shown), for example, of roof tiles.

Figure 2 shows in the region of the air layer 3' a top view of the rafters 7 with which the bearing structure of the roof element is prepared.

In the illustrated exterior wall panels of a building the air from the air layers 3, 3' is heated by the lost heat escaping from the room and is pumped to a heat pump. The heat pump removes the lost heat from the air and feeds the cooled air back into the intermediate spaces 3, 3'. The outer insulating layer 5, 5' is used to prevent heat transfer from the air layer 3, 3' to the weather-side outer layer, for example the weather-side masonry shell or the roof tiles (not shown). For a structure with only the insulating layer 5, 5', according to the findings of the inventor a large part of the heat contained in the intermediate air space 3, 3' is lost to the outside. The heat transfer from the air layer 3, 3' to the outside takes place specifically also to a large extent via heat radiation. This heat radiation at this point is now reflected as claimed in the invention by the reflecting foil 4, 4' in the intermediate air space 3, 3', so that heat loss is avoided.

The arrangement as claimed in the invention achieves its highest efficiency in a system in which the air in the air layer 3, 3' is used

for heat recovery. A certain advantageous effect can however also be achieved for normal, rear-ventilated wall constructions when as the reflecting layer 4, 4' is used as claimed in the invention.

Claims

1. Exterior wall panel of a building with a weather-side outer layer (6); an air layer (3; 3') which adjoins on the room side, and an insulating layer (2, 5; 2', 5'), characterized in that on the exterior boundary of the air layer (3; 3') there is a layer (4; 4') which reflects heat radiation.

2. Exterior wall panel of a building as claimed in Claim 1, wherein the reflecting layer is formed by a foil (4; 4') with which the insulating layer (5; 5') which points toward the weather-side outer layer (6) is lined.

3. Exterior wall panel of a building as claimed in Claim 1 or 2, wherein the room-side boundary of the air layer (3; 3') is formed by an insulating layer (2; 2').

4. Exterior wall panel of a building as claimed in one of Claims 1 to 3, wherein the air layer (3; 3') is connected to the input of a heat pump with an output which is returned again to the air layer (3; 3').

5. Exterior wall panel of a building as claimed in Claim 4, wherein the circuit formed between the air layer (3; 3') and the heat pump is closed.

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Fig. 2

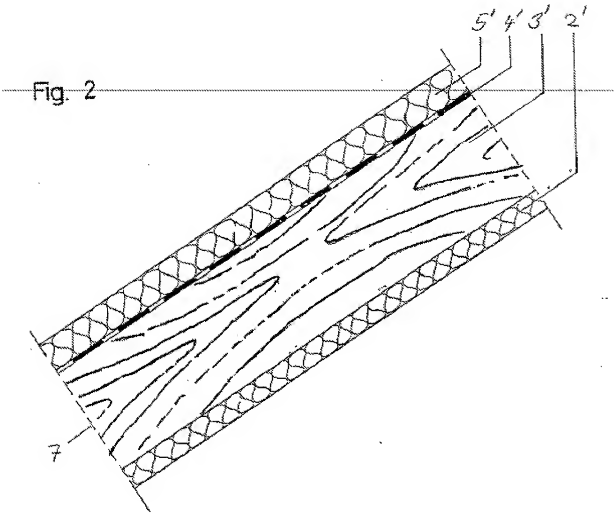

Fig. 1